

CLAIMSWhat is claimed is:

1. A composition comprising a perfluoropolyether, which has the formula selected from the group consisting of $F(C_3F_6O)_zCF(CF_3)CF_2X$,
5 $XCF_2CF(CF_3)O(C_3F_6O)_pR_f^2O(C_3F_6O)_nCF(CF_3)CF_2X$,
 $XCF_2CF_2O(C_3F_6O)_xCF(CF_3)CF_2X$, $(R_f^1)(R_f^1)CFO(C_3F_6O)_xCF(CF_3)CF_2X$,
and combinations of two or more thereof wherein X is I or Br, x is a number from 2 to about 100, z is a number from 5 to about 100, p is a number from 2 to about 50, n is a number from 2 to about 50, a is 1 or 2,
10 each R_f^1 is independently a monovalent C_1 to C_{20} branched or linear fluoroalkane, and R_f^2 is a divalent C_1 to C_{20} branched or linear fluoroalkane.
2. A composition according to claim 1 wherein said composition is said perfluoropolyether.
- 15 3. A composition according to claim 1 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is at least about 6.
4. A composition according to claim 2 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is at least about 6.
5. A composition according to claim 1 wherein said
20 perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is about 8.
6. A composition according to claim 2 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is about 8.
7. A composition according to claim 1 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is about 52.
- 25 8. A composition according to claim 2 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$ wherein z is about 52.
9. A composition according to claim 2 wherein said perfluoropolyether is $F[C_3F_6O]_zCF(CF_3)CF_2X$.
10. A composition according to claim 2 wherein said
30 perfluoropolyether is $XCF_2CF(CF_3)O(C_3F_6O)_pR_f^2O(C_3F_6O)_nCF(CF_3)CF_2X$.

11. A composition according to claim 2 wherein said perfluoropolyether is $\text{XCF}_2\text{CF}_2\text{O}(\text{C}_3\text{F}_6\text{O})_x\text{CF}(\text{CF}_3)\text{CF}_2\text{X}$.

12. A composition according to claim 2 wherein said perfluoropolyether is $(\text{R}_f^1)(\text{R}_f^1)\text{CFO}(\text{C}_3\text{F}_6\text{O})_x\text{CF}(\text{CF}_3)\text{CF}_2\text{X}$.

5 13. A process comprising contacting (1) a perfluoropolyether acid fluoride with a metal bromide or metal iodide or (2) heating a perfluoropolyether secondary halide each under a condition sufficient to effect the production of a perfluoropolyether comprising at least one bromine or iodine in the primary position of one or more end groups of the
10 perfluoropolyether wherein said process is carried out substantially free of a solvent.

14. A process according to claim 13 wherein said acid fluoride moiety comprises $-\text{CF}_2\text{OCF}(\text{CF}_3)\text{COF}$ moiety.

15 15. A process according to claim 13 wherein said perfluoropolyether is a perfluoropolyether primary iodide and said process comprises contacting said perfluoropolyether primary iodide with carbon tetrabromide.

16. A process according to claim 13 wherein said process comprises contacting said perfluoropolyether acid fluoride with mixed
20 metal bromides, mixed metal iodides, or combinations thereof.

17. A process according to claim 16 wherein said mixed metal bromide and iodide is a mixture of aluminum bromide and boron bromide.

18. A process according to claim 13 wherein the metal moiety of said metal bromide or metal iodide is selected from the group consisting of
25 lithium, calcium, barium, aluminum, boron, and combinations of two or more thereof.

19. A process comprising contacting a perfluoropolyether acid fluoride with a metal bromide or metal iodide under a condition sufficient to effect the production of a perfluoropolyether, which comprises an acid
30 fluoride moiety and at least one bromine or iodine at the primary position

of one or more end groups wherein said process is carried out substantially free of a solvent and said perfluoropolyether comprises repeat units derived from the group consisting of

5 -CF₂O-, -CF₂CF₂O-, -CF₂CF(CF₃)O-, -CF(CF₃)O-, -CF(CF₃)CF₂O-,
-CF₂CF₂CF₂O-, -CF(CF_s)O-, -CF₂CF(CF_s)O-, -CF₂CF(CF₂CF₃)O-,
-CF₂CF(CF₂CF₂CF₃)O-, -CF(CF₂CF₃)O-, -CF(CF₂CF₂CF₃)O-,
-CH₂CF₂CF₂O-, -CF(Cl)CF₂CF₂O-, -CF(H)CF₂CF₂O-, CCl₂CF₂CF₂O-,
-CH(Cl)CF₂CF₂O-, and combinations of two or more thereof.

20. A process according to claim 19 wherein said acid
10 perfluoropolyether further comprises an acid fluoride moiety.

21. A process according to claim 20 wherein said fluoride comprises a -CF₂OCF(CF₃)COF moiety.

22. A process according to claim 19 wherein said
perfluoropolyether is a perfluoropolyether primary iodide and said process
15 comprises contacting said perfluoropolyether primary iodide with carbon tetrabromide.

23. A process according to claim 19 wherein said process comprises contacting said perfluoropolyether with mixed metal bromides, mixed iodides or combinations thereof.

20 24. A process according to claim 23 wherein said mixed metal bromide and iodide is a mixture of aluminum bromide and boron bromide.

25. A process according to claim 19 wherein the metal moiety of said metal bromide or metal iodide is selected from the group consisting of lithium, calcium, barium, aluminum, boron, and combinations of two or
25 more thereof.

26. A process according to claim 19 wherein said perfluoropolyether comprises repeat units derived from -CF(CF₃)CF₂O-.